

Achieving Scientific Rigor in Organizational Diagnosis: An Application of the Diagnostic Funnel

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Using an operational framework, the diagnostic funnel is introduced, which prescribes the appropriate actions of a process consultant in conducting an organizational diagnosis. The diagnostic funnel comprises the four actions of (a) selecting a general diagnostic model, (b) collecting data that minimizes bias, (c) analyzing the data to reduce the likelihood of error, and (d) deriving a unique diagnostic paradigm, specific to the organization under study. It is argued that the actions described by the diagnostic funnel will result in a diagnosis that achieves a high level of scientific rigor. To provide a detailed description of the diagnostic funnel, a case example of an organizational diagnosis is presented.

Keywords: action research, diagnostic funnel, organizational diagnosis, qualitative methodology, triangulation, unique diagnostic paradigm, organizational change

Action research is a four-step process, comprised of problem diagnosis, action planning, implementation, and evaluation, that is useful for managing planned organizational change (Lewin, 1946). Organizational members are involved throughout the process in identifying issues that inhibit organizational effectiveness (i.e., problem diagnosis), planning appropriate interventions (i.e., action planning), executing the changes (i.e., implementation), and determining whether changes to the organization produced the desired outcomes (i.e., evaluation). Research on this elevated level of employee participation has demonstrated positive effects, including stronger accep-

tance of results by both managers and non-managers, as well as increased success for organizational change initiatives (Nutt, 1986).

Proper identification of organizational issues is a critical aspect of quality action research, as the success of all subsequent research steps is dependent on accurately diagnosing the issues that are important to the specific organization. Consequently, minimizing bias and error during problem diagnosis is of significant importance to ensure successful organizational change.

In this article, we develop a framework that can be used to conduct an accurate qualitative organizational diagnosis. Hammersley and Atkinson (1983), described the conduct of qualitative research as representing a *funnel concept*; consequently, we label this framework the *diagnostic funnel*. The diagnostic funnel is a schematic representation of four actions: (a) selecting a general diagnostic

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model, (b) collecting data using a method that minimizes *bias*, (c) analyzing the data, so as to reduce the likelihood of *error*, and (d) developing a unique diagnostic paradigm, one that is *specific* to the organization under study. Because qualitative methodologies are susceptible to bias and error from action researchers and organizational members, the actions taken throughout the diagnostic funnel are explicitly intended to produce a scientifically rigorous organizational diagnosis.

To explain the diagnostic funnel, we present a case study of an actual organizational diagnosis, conducted by a team of process consultants. We describe the specific actions taken to apply a general diagnostic model, to collect data, and to analyze the data in a way that produces a unique diagnostic paradigm for the organization under study. Revealing a unique diagnostic paradigm is valuable to help understand the functioning of an organization, as the paradigm reveals the *relevant* productive and unproductive actions and behaviors unique to the organization. A final step with this diagnosis is the triangulation of our findings with independent data collected from the same organizational members using a quantitative methodology.

The Diagnostic Funnel: An Operational Framework

The diagnostic funnel serves as a guide for diagnosticians during an organizational diagnosis. Each action within the funnel is detailed in Figure 1 and described below.

Diagnostic Models

A diagnostic model (a) identifies the relevant variables within a system, (b) depicts the relationships among the variables, and (c) describes how the performance of the system can be influenced (Burke, 2002). The diagnostic model prescribes which

data diagnosticians are to perceive, collect, and analyze (Nadler & Tushman, 1980). Bias can enter an organizational diagnosis if a diagnostician uses an inappropriate model. This may occur when a consultant promotes a *canned program* and in effect fits the client's data to a predetermined diagnosis, an outcome that has been labeled *template diagnosis* (Armenakis, Mossholder, & Harris, 1990).

Levinson (1972, 2002) recommends the use of a general diagnostic model to reduce the likelihood of conducting a biased diagnosis. The general diagnostic model used in this diagnosis was developed by Likert (1967) and classifies variables into three distinct organizational effectiveness categories: causal variables, intervening variables, and end-result variables. For the sake of simplicity, we refer to end-result variables as outcome variables, hence, Likert's Casual-Intervening-Outcome (CIO) Model. The CIO model contends that organizations function such that causal variables have an influence on intervening variables, which finally impact outcome variables.

Causal variables include organizational structure and objectives, as well as managerial practices and behaviors. Intervening variables include motivation, expectations, perceptions, and attitudes toward the organization and its management, including job satisfaction. Outcome variables are the items typically used to judge the performance of the organization. Examples of outcome variables include resources acquired, revenue generated, profit, scrap, and financial growth. Consequently, in order to manage changes that will positively impact intervening and outcome factors, managers must focus on changing those causal factors that are problematic for the organization. Intervening and outcome variables cannot be manipulated directly. To change an outcome variable, one must manipulate the appropriate causal variables that are interacting with the appropriate intervening variables (Likert, 1967).

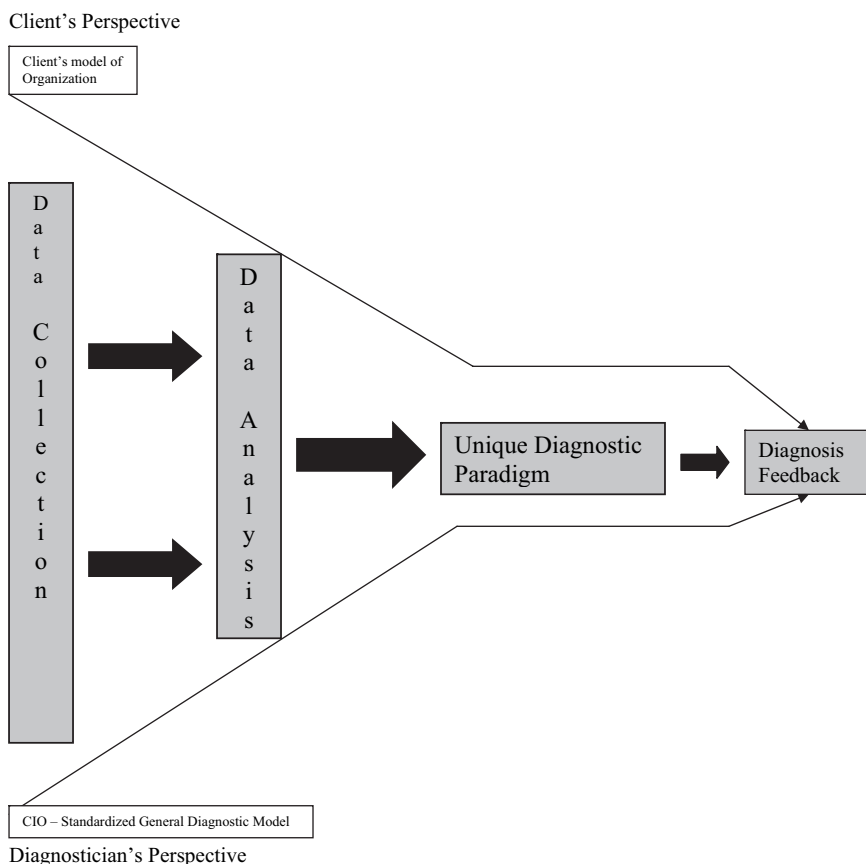


Figure 1. Diagnostic funnel. CIO = Casual-Intervening-Outcome.

Data Collection

Diagnostic data can be collected using observation, interview, questionnaire, and archival methods. Any convenience offered by a quantitative data collection method (e.g., a questionnaire) must be weighed against the possibility of introducing bias in a diagnosis. To avoid bias, it is important to collect as much information on diverse topics from as many people as possible. This preferred situation is represented as the widest part of the diagnostic funnel (see Figure 1). The goal during initial data collection is not to prompt respondents to discuss a particular issue, but to allow respondents to discuss any issue that is important to them. If the diagnostician limits the data

collection to a set of predetermined measures, the very selection of those measures may bias the results. For example, the selected measures may represent issues that are of particular interest to the diagnostician or issues the *diagnostician* feels are critical to the organization. Allowing *respondents* to determine the content of the data collected lessens this diagnostic bias and increases the likelihood that the data collected are relevant to the target organization. Employees have a better understanding of how they are being affected by organizational issues than external consultants. To minimize diagnostic bias for this organizational analysis, data were collected from organizational members using an open-ended

question format, thus allowing each respondent to structure responses from her own perspective.

Data Analysis

In data analysis, care must be taken to ensure the data are correctly interpreted. For qualitative research design, responses to questions require substantial analysis. First, responses must be classified into the major dimensions of the model, such as causal, intervening, and outcome variable classifications. Next, the responses for each dimension must be combined into specific themes (Bachiochi & Weiner, 2002), such as communication issues or decision-making practices. Here, individual responses are aggregated into salient themes via condensation and categorization. For this particular organizational analysis, we followed a procedure that maximized the likelihood that condensation and categorization, while theme building resulted in unanimity among the diagnostic team.

Unique Diagnostic Paradigm

The final step in the diagnostic funnel methodology is the development of a unique diagnostic paradigm that is specific to the needs of the target organization. This paradigm includes the specific variables that are responsible for the organization's current level of performance. Through qualitative data collection, organizational members share the positive and negative attributes of the organization; this open-ended information will inevitably lead to a distinctive, firm-specific approach to organizational issues. The important consideration here is that the unique diagnostic model is not predetermined; instead, it is generated through the process of analyzing qualitative data.

When using a quantitative methodology, on the other hand, the diagnostic paradigm is essentially specified in advance. For example, when conducting survey-based

analysis, the organizational attributes are preselected during survey design and assessed through the administration of closed-ended, forced-choice questionnaire items. For this particular organizational analysis, our team was able to create a diagnostic paradigm unique to the organization *after* a thorough analysis of qualitative data gathered via open-ended collection techniques.

Method

Organizational Context

The organizational diagnosis was performed for a government-funded research organization charged with a mission of advancing the technology used by military personnel in combat situations. At the time of the analysis, the organization employed 100 individuals, with an annual budget in excess of \$200 million. Despite the fact that this organization is a government entity, it operates in a highly aggressive environment with intense competition among public- and private-sector organizations for limited budgetary funds from a few, very powerful, military customers.

In response to these competitive and customer-driven forces, the top management team recognized the importance of continuously improving organizational performance. Management hoped that a thorough organizational diagnosis would provide valuable information to support their continuous improvement initiatives. The target organization had previously used quantitative surveys measuring constructs such as job satisfaction, access to resources, customer orientation, teamwork, and employee development. The results of these surveys were made available to the research team.

Diagnostic Methodology

Our diagnostic methodology was qualitative, asking broad, open-ended ques-

tions to a wide cross-section of employees in the hopes of reducing both consultant and employee bias. To reduce consultant bias, the questions were not designed to prime participants toward specific responses that could easily be fitted to a predetermined diagnostic paradigm. Instead, data collection was from the perspective of the employees. Here, each employee serves as an informant. Granted, informants can bias the data collection by promoting their own *hidden agendas* instead of accurately relaying the organizational issues to the diagnosticians. *Hidden agendas* can be identified through collecting data from multiple informants and corroborating those data with data from other sources. The use of multiple informants has been shown to increase validity and reduce the amount of random error (Kumar, Stern, & Anderson, 1993; Van Bruggen, Lilien, & Kacker, 2002).

Participants

The possible participants in the organizational analysis were all 100 employees of the organization. A total of 48% of the employees were scientists or engineers; 84% of the workforce had bachelor's degrees; 37% held advanced degrees. The average age of an employee in the organization was 41; 63% were male; and 75% were classified as Caucasian.

The data collection consisted of two phases: (1) personal interviews, and (2) Web-based survey. Twenty-one employees participated in the personal interview phase. The sampling methodology used to select employees for the personal interviews was cross-hierarchical so all organizational levels and pay grades were represented. The Web survey was made available to all employees and received a total of 49 responses. Ten of the Web survey respondents indicated they had participated in the interview portion of the data collection; therefore, 60 different

employees participated in data collection for the organizational diagnosis.

Personal Interviews

Data Collection

Consistent with the diagnostic funnel, interview questions were broad and open-ended. The specific questions were as follows: (a) What are your job duties?, (b) What are the strengths of the organization?, (c) What are the weaknesses of the organization?, (d) What would you like to see changed?, and (e) Would you like to offer any other comments? These questions were e-mailed prior to the interview so that each employee could have time to think about their responses.

At the time of the interviews, the researchers asked each question and took handwritten notes. The first question was designed to collect basic background information, which allowed our team to better understand the employee's perspective and position within the organization. The second question allowed the employee the opportunity to discuss issues of a positive nature, while the third and fourth questions focused on issues that are considered detrimental to the performance of the organization. The second, third, and fourth questions made up the bulk of the data collected and provided the basis for the data analysis. The final question, asking for additional comments, enabled the respondent to offer any reaction not appropriate for the prior four questions.

Data Analysis

The notes from each interview were used to categorize respondent comments. The diagnostic team combined similar comments from respondents into specific themes. For example, all positive comments about the firm's leadership were categorized into a theme called leadership. The categorizing was done such that each

statement was classified into only one theme. The themes that represented strengths were kept separate from the themes that represented the weaknesses, such that there could be a theme for leadership under strengths and weaknesses. As the themes were developed, they were categorized as a causal, intervening, or outcome factor according to Likert's (1967) definitions.

The next step of data analysis was to develop a master set of themes for the interview data. This part of the analysis was carried out during several team meetings. During these meetings, each team member presented the themes that had emerged from their interviews and defined each theme for the group. This process was continued until a master set of themes existed within which each interviewee comment could be classified.

The diagnostic team then recoded their interviews into the themes from the master list. To ensure accuracy in coding, interview responses were coded to the master list twice; once by the project team leader and once by the interviewer. Any differences in coding were discussed and reconciled, until unanimous agreement was reached. This process was designed to limit the amount of error present in the themes. Although the coding disagreements were minimal, it is important to point out that we were not interested in computing an initial coder agreement index, like Krippendorff's alpha (Krippendorff, 2004), but rather, we wanted to be confident that we maximized the accuracy of our final analysis.

Once unanimity was reached, the themes were organized into a theme matrix, where we could easily count the number of respondents who mentioned each particular theme while ensuring that each respondent was not double counted. If a respondent made several comments about a particular theme, the coding associated with each of the comments was recorded into a single cell in the matrix. Table 1 shows an example portion of the theme matrix for three causal weaknesses.

Web Survey

Data Collection

In an attempt to capture data from the employees who were not interviewed and to collect additional data from the employees who were interviewed, a web survey was conducted. To remain consistent with the diagnostic funnel, the survey was designed to collect a wide array of data via three open-ended items. The survey items were as follows: (1) What are the strengths of the organization?, (2) What are the weaknesses of the organization?, and (3) What other comments would you like to offer?

In addition to the qualitative data, two demographic items were also included in the survey. The respondent was asked their job classification code, which classifies the respondent according to their hierarchical rank in the organization. The survey also asked whether or not the respondent had participated in the face-to-face interviews. This question was included so that overlap

Table 1
Example Portion of Theme Matrix for Causal Weaknesses

Human resource management practices	Employee 1	Employee 2	Employee 3
Selection	b	o	k,m
Performance appraisal		c,e,k	
Training and development	c,f,j		b,l
Leadership	a	b	
Communication		g,i	d

between the two data collection methods could be identified.

Data Analysis

The survey data were evenly distributed among the diagnostic team. Each member of the diagnostic team coded their portion of the survey data into the master theme list from the personal interviews so that theme language and definitions remained consistent. Any respondent comments that did not fit into an existing theme from the master list were identified. The diagnostic team then met to discuss and define the themes that emerged from the Web-survey data. Once the new themes were defined, a final master theme list was prepared. The Web-survey data were then recoded by both the team members and the team leader and reconciled in the same manner as the personal interview data.

Results

Sample Representativeness

Sixty different employees participated in the diagnosis, generating a total response rate of 60%. A comparison of the respondent demographics to those of organization indicated the respondents were representative of the organization at large.

Unique Diagnostic Paradigm

Relative frequencies for each theme were used to develop the unique diagnostic paradigm for this organizational analysis. The relative frequencies represent the percentage of respondents who commented on each theme. The frequencies were calculated such that all comments from an individual on a particular theme were counted only once, so that a respondent who made multiple comments about a theme would not skew the results. These relative frequencies were used to prioritize the themes

as part of the report given to the organization.

The unique diagnostic paradigm consisted of strengths and weaknesses for each of the causal, intervening, and outcome factors. Because our diagnosis was intended to identify the relevant causal variables that will impact intervening and outcome variables, we summarize only the top six causal strengths and weaknesses in Table 2. Although it is important in diagnosis to point out the practices that are considered positive so that they can be intentionally continued, the ability of a diagnosis to truly move the organization forward lies in the identification of the practices that are hampering the performance of the organization.

Triangulation With the Quantitative Data

The client organization administered quantitative surveys in each of the previous two years, as mandated by their parent organization. The most recent questionnaire (administered less than 12 months prior to the qualitative analysis and completed

Table 2
Unique Diagnostic Paradigm: Causal Factors

Theme (top six)	Percentage of participants (<i>n</i> = 70)
Strengths	
People/personnel	60
Leadership	47
Strategy/mission	24
Communication	23
Good job	21
Benefits	13
Weaknesses	
Human resources management practices	65
Leadership	51
Communication	42
Strategy/mission	31
External issues	17
Funding	14

Note. Ten web survey respondents indicated they had participated in the interview portion of the data collection.

by 70 participants) included 37 closed-ended, forced-choice items that the organization had grouped into 14 different categories, including leadership, customer orientation, and access to equipment. Several of these quantitative items were consistent with the themes generated from the qualitative analysis. Consequently, we were able to regroup 20 items from the quantitative survey into the top three causal weakness categories from the qualitatively derived unique diagnostic paradigm (human resource management practices, leadership, and communication).

Additionally, the quantitative survey results were analyzed according to gap and trend analysis. To make these analyses possible, the organization's management team was asked to create a judgmental norm (Armenakis & Feild, 1987) for all variables, whereby they agreed that a proper benchmark for their firm was for 85% of survey respondents to respond favorably to each survey item.

The *gap analysis* reports the difference between the actual percentage of employees who responded favorably and the judgmental norm of 85%. Here, an item with a gap of -50 would have received a favorable response from only 35% of respondents. The average gap on those 20 items we were able to regroup according to the unique diagnostic paradigm was -30 , significantly below the judgmental norm.

The *trend analysis* reports either an increase or decrease in the percentage of respondents who answered an item favorably when compared to the percentage of respondents who answered that item favorably in the survey from the previous year. All available data on the 20 items reported a decreasing trend, indicating a wider gap in the most recent year over the previous year. The significant size of the gap for each of these variables, as well as a general trend showing less favorable responses, lends support to the results of the qualitative analysis; human resource management

practices, leadership, and communication represent significant organizational issues for this firm. Thus, we were able to triangulate (Paul, 1996) the conclusions drawn from the qualitative methodology with those from the quantitative analysis.

Although our methodology was supported by quantitative data, the content of the qualitative comments we analyzed was more descriptive and provided more insight into corrective actions. For example, one quantitative item classified as communication asked respondents to indicate the degree to which they agreed with the following statement:

"People in my office get the facts and the information needed to do a good job."

From our qualitative methodology we recorded the following example comments:

"There is a heck of a lot of competition between divisions, mostly because management does not do a good job at communicating priorities. When priorities are communicated they seem inconsistent with the way things are run."

"Poor communication between divisions causes unnecessary outsourcing."

Regarding the strategy/mission of the organization, a quantitative item asked respondents to indicate the degree to which they agreed with the following:

"Managers communicate the organization's mission, vision, and values."

Our qualitative methodology produced the following example comments:

"Divisions are organized to be competitive with each other."

"No integration."

"Too much stove piping."

We can conclude from these qualitative comments (as well as other comments not mentioned here) that many employees do not feel that management is doing an adequate job of promoting a cohesive working environment; often employees are frustrated that management publicly states that

all divisions are to work together to achieve the organizational mission, yet actions do not always reinforce this policy. This conclusion was possible, in part, due to the richness of the qualitative data to provide an in-depth and personal description of life in the organization. We suggest that our qualitatively derived conclusions are more descriptive and useful than those conclusions from the quantitative methodology.

Another important finding that contributes to the credibility of our unique diagnostic paradigm was that the qualitative methodology revealed themes that were not included in the quantitative survey. In other words, we uncovered issues the quantitative survey did not address. Furthermore, there were 17 items on the quantitative survey that could not be categorized into one of our themes. This interesting difference posed three questions about the items on the quantitative survey. First, could we infer that our diagnosis uncovered the most important issues on the minds of the employees? Our answer was most definitely yes. Second, were the respondents simply expressing their frustrations at the organization's leaders by responding negatively to virtually all items on the quantitative survey? Possibly, yes. Third, since the quantitative survey forced respondents to address predefined items, were the 17 items unique to the quantitative survey even relevant organizational issues in the minds of these respondents? Potentially, they are not.

Under no circumstances do we imply that the quantitative data were not valuable. On the contrary, we suggest that the combination of both qualitative and quantitative data was more descriptive of the organization's issues and more prescriptive of potential change initiatives than the quantitative data alone.

Discussion

In this article, we address eight issues that can influence the scientific rigor of an

organizational diagnosis. First, we demonstrate the steps that can lead to a systematic qualitative diagnosis. Our informal review of the organizational change literature revealed a paucity of research on diagnosis. In addition, the bulk of empirical research published in the organizational sciences is based on quantitative survey data. At a minimum, we hope our findings encourage consulting psychologists who favor quantitative analyses to include a qualitative portion to their quantitative surveys.

A second issue is we conceptualize our methodological approach in terms of the diagnostic funnel. As pointed out early in the article, qualitative researchers have referred to the funnel concept in their research endeavors (Hammersley & Atkinson, 1983). We incorporated it here because it allows diagnosticians to visualize a mental image of the diagnostic process whereby a wide array of data are collected from as many individuals as possible and that data are carefully condensed into a unique diagnostic paradigm.

Our third issue is the application of Likert's (1967) CIO model as a general diagnostic model. As documented, a general diagnostic model is recommended for organizational diagnoses (Levinson, 1972, 2002). Likert's model is seldom, if ever, referred to as a diagnostic model. However, we contend it is a useful model for diagnosticians. Effective problem solvers consciously (or perhaps unconsciously) sift through information to get at the *root cause* of suboptimal organizational performance (Tichy, Hornstein, & Nisberg, 1977). We argue that explicitly thinking in terms of causal, intervening and outcome terms contributes to the scientific rigor of any diagnosis.

A fourth issue addressed is potential consultant and client bias. The questions asked during the data collection were designed so that priming effects would be minimized. The respondents were asked about the strengths and weaknesses of their

organization only. The respondent initiated all issues that were mentioned during the data collection process. Consultant bias was greatly reduced when the data collection process was designed to allow the respondents to suggest the subject matter of the diagnosis. Thus, consultant bias was controlled by posing general open-ended questions to the organization's employees. Additionally, client bias (e.g., hidden agendas) was reduced by the use of multiple informants and our data corroboration procedure.

Fifth, we explained the steps taken to maximize diagnostician accuracy. We were very conscientious to ensure that our conclusions were as accurate as possible. Additionally, we wanted added confidence in our accuracy, so we followed a systematic process whereby a group of process consultants jointly discussed the data and unanimously agreed with the coding of the data. The use of multiple iterations of intercoder analyses reduced the chance that the inferences made by the diagnostic team were based on one individual's perception. This inclusion of multiple perceptions of the data should result in an analysis that more accurately reflects the true situation in the organization.

Sixth, we arrived at a unique diagnostic paradigm, specific to the client organization. The rationale for our diagnostic methodology is based on the premise that every organization is unique and therefore, the issues affecting each organization are also unique. Attempting to capture these unique sets of variables via generic diagnostic instruments aimed at assessing typical organizational phenomena could warp the results, whereas allowing the respondents to suggest the issues of importance to their organization ensures that the relevant issues are being captured. We argue that one of the key benefits of our methodology is more descriptive theme data and stronger relevance of identified themes to this organization than those themes included on the

quantitative survey. By not restricting the data collection to a predetermined set of defined constructs, qualitative research can generate an open flow of ideas. This wider variety of perspectives is thought to be especially useful when dealing with complex issues such as organizational diagnosis and potential organizational changes (St. Clair & Quinn, 1997). Consequently, allowing groups of employees to engage in action planning using the qualitative data increases the likelihood of a more comprehensive treatment of the organization's issues. This unique diagnostic paradigm keeps the diagnosis consistent with Lewin's (1946) suggestion that action research should interpret data through the unique context of the organization. The specificity of the information generated from this process provides the organization with the ability to plan interventions that are tailored for their particular circumstances.

A seventh issue deals with the balanced approach we took in assessing both the organization's strengths and weaknesses. The ability to ask the participants about the organization's strengths and weaknesses in an open-ended format allows for a broader appreciation of the role that those variables play in the organization. One of the interesting consequences of studying the organization's strengths and weaknesses is that a particular variable can act as both strength and weakness. For example, leadership was mentioned by 47% of respondents in our qualitative analysis as an organizational strength while 51% of the respondents reported that the firm's leadership represented an organizational weakness. Indeed, it is even possible that the same respondent referred to leadership as both a strength and as a weakness; some leader behaviors may be perceived as strengths whereas different behaviors may be weaknesses. Although at first these results seem contradictory, they are no different than results that are typically drawn

from quantitative measures. For approximately half of the respondents to answer a quantitative item on leadership favorably while the other half answer the item unfavorably would not be an uncommon result. However, such a result may not provide a deep understanding of the manner in which leadership acts as both a positive and negative force within the organization. The interpretation of such a result would most likely be that there is not a strong opinion about leadership one way or the other. Our qualitative data revealed that some specific leadership practices were the organization's biggest strengths while other leadership practices represented significant weaknesses. Therefore, the value of qualitative data is it provides a richness that is seldom available from quantitative data.

Finally, we triangulated some of our findings with the findings from the previously conducted quantitative surveys. Despite the possibility of interpretation differences between qualitative and quantitative data, both types of data in this analysis produced similar results. The consistency of the results across the quantitative and qualitative analyses lends added credibility to the findings and provides support for the actions described by following the diagnostic funnel. The analysis of the qualitative data relied on inferences made by the diagnostic team, and even though every effort was made to reduce the bias in those inferences, there remains a possibility that the results generated from the qualitative data contain some bias. However, using the quantitative data to triangulate the qualitative findings suggests that the qualitative results accurately reflect the relevant issues for this organization.

Collectively, the eight issues influencing the scientific rigor of an organizational diagnosis addressed in this article provide support for the validity of the consultative process we refer to as the diagnostic funnel. A consultant who performs an organizational diagnosis without following a sys-

tematic process cannot be sure that their findings reflect the true situation in the client organization, as it is the process that limits the error and bias inherent in any diagnosis. The diagnostic funnel provides the consulting psychologist with a blueprint that takes advantage of the benefits of qualitative data, limits error and bias, and results in a diagnosis that is both accurate and unique to the client organization.

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